velocity of water flow; and survival of the retained fish.

We recommend that before screen criteria are determined for delta smelt, studies also be conducted on delta smelt behavior in the presence of a screen, post-impingement survival, and post-impingement swimming performance.

Some of the preserved juvenile specimens were borrowed through Dr. Johnson Wang (consultant to DWR and USBR) and Lloyd Hess (Tracy Fish Facility). Preserved subadult and adult specimens were lent from collections of Dr. Christina Swanson, Dr. Serge I. Doroshov and Mr. Randy Mager (UC-Davis). We are grateful to Dr. Doroshov for use of the Microplan II image analyzer; to Dr. Swanson for providing us with more than 128 fresh delta smelt; and to Jennifer Lorenzo, Melissa Gonzales, and Megan Sheeley for technical assistance.

Literature

Margraf, F.J., D.M. Chase, and K. Strawn. 1985. Intake screens for sampling fish populations: the size-selectivity problem. *North American Journal of Fisheries Management.* 210-213.

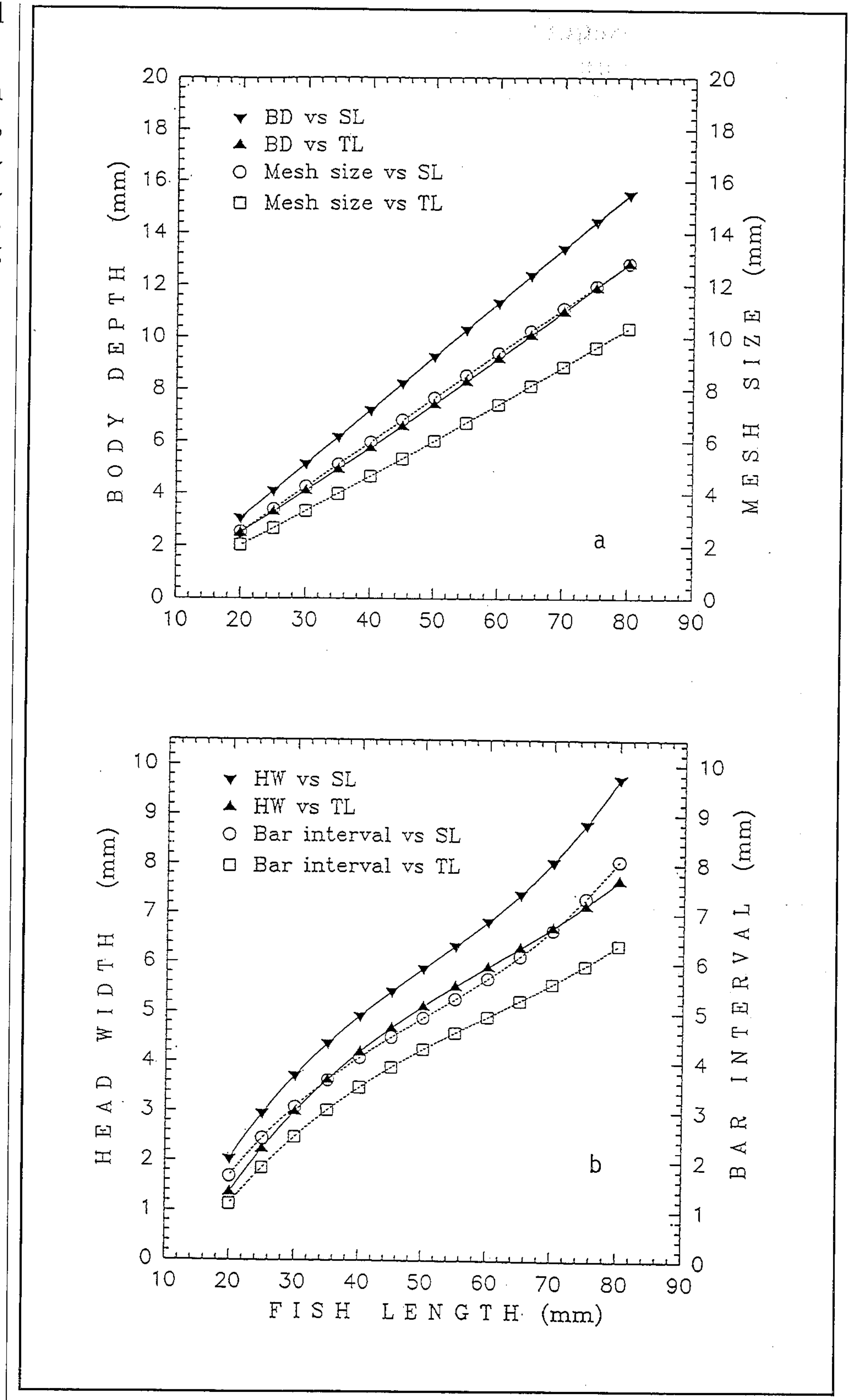

Figure 1
CALCULATED MAXIMUM BODY DEPTH AND SCREEN MESH SIZE (top) AND CALCULATED MAXIMUM HEAD WIDTH AND VERTICAL INTERVAL (bottom) IN RELATION TO TOTAL LENGTH AND STANDARD LENGTH IN DELTA SMELT

Clam-Stuffed Sturgeon

Heather Peterson, DWR

In my studies of the introduced species *Potamocorbula amurensis* and its impact on the food web dynamics of the estuary, I have encountered some argument about whether *P. amurensis* was actually being used as a food resource. Analysis of the fore and hind gut of a white sturgeon found in San Pablo Bay in October 1996 may help explain the role of *P. amurensis* in providing a food resource for bottom-feeding fish, particularly sturgeon. The gut contents were analyzed by Wayne Fields of Hydrozoology Inc, Newcastle, California. Following is a portion of his report:

In a typical analysis of a fish stomach, attention is paid only to the contents of the foregut since this consists of recently eaten food, and easily digested items may still be evident, giving a relatively true picture of the feeding habits of the fish in question (food items with no hard structures to resist digestion may be dissolved immediately). The hindgut contents are usually ignored since indigestible foods tend to lodge there for varying and unknown periods and there are no easily digested items left. In the current analysis, however, since the stomach sample was available, I chose to look at both parts of the stomach.

Foregut:
The foregut contained 214 countable (and essentially intact) clams, all *Potamocorbula amurensis*, parts of seven Idoteid isopods (probably *Syniodtea laevidorsalis*) and a single amphipod (*Ampelisca abdita*). Recognizable items made up about 1/4 of the volume of the foregut (total volume about 150 mL). The remaining volume was all pieces of *P. amurensis* shell.

Hindgut:
The hindgut contained 501 countable clams, all *P. amurensis*, parts of two Idoteid isopods (probably *S. laevidorsalis*) and the posterior end of a single shrimp (probably *Palaemon macrodactylus*) These items made up about 40% of the hindgut volume, the rest being *P. amurensis* pieces. The total volume was about 250 mL.

Given the muscular nature of a foregut adapted to crushing food items, it was surprising to find that anything in the hindgut was in one piece. It was even more surprising that there was a larger ratio of whole clams to clam pieces (in terms of volume) in the hindgut than in the foregut, and that the clams in the hindgut (as well as other softer food items which should have been digested) were in about the same shape as the same type of food in the foregut. This suggests that food items were moving through the gut at a relatively rapid pace, apparently not staying around long enough for complete digestion. It may be that there is now so much food available (in the form of *P. amurensis*) to bottom feeding fish like the white sturgeon that complete digestion of every food item is unnecessary.

Although one analysis does not represent conclusive evidence about the feeding habits of other fish in the estuary, results of this analysis indicate that *P. amurensis* is providing a generous food resource to bottom-feeding fish.

New Technical Reports

Several Interagency Technical Reports have been released in the past few months. If you would like a copy of any of these, please contact Lisa at 916/227-7541 or lbatiste@cd-eso.water.ca.gov.

47 *1995 Pilot Real-Time Monitoring Program: Evaluation and Recommendations*
(C. Armor, L. Winternitz, D. Sweetnam, P. Brandes, R. Baxter)

49 *Winter-Run Chinook Salmon Captive Broodstock Program: Progress Report through April 1996*
(K. Arkush, M. Banks, S. Hamelberg, D. Hedgecock, P. Siri)

50 *Adult Salmon Migration Monitoring, Suisun Marsh Salinity Control Gates, September-November 1994*
(G. Edwards, K. Urquhart, T. Tillman)

51 *Otolith Aging of Larval and Juvenile Striped Bass in California*
(S. Foss, L. Miller)

52 *An Assessment of the Likely Mechanisms Underlying the "Fish-X2" Relationships*
(Estuarine Ecology Team)

54 *A Telemetry Study of Striped Bass Emigration from Clifton Court Forebay: Implications for Predator Enumeration and Control*
(M. Gingras, M. McGee)